2.0 Effectiveness of Paragraph 8 Construction Projects

A series of construction projects, referred to as Paragraph 8 projects, were completed within the Gwynns Falls Sewershed. The purpose of these projects was to reduce the frequency and volumes of overflows. The Paragraph 8 construction project locations are shown on Map 2.0.1.

2.1 Engineered Overflow Locations

A total of 10 SSO and 11 CSO structures were identified in the Gwynns Falls Sewershed at the time the Consent Decree was signed:

SSO #16P	SSO #17P	SSO #22P	SSO #23P	SSO #24P
SSO #28P	SSO #29P	SSO #30P	SSO #33P	SSO #84
CSO #10P	CSO #11P	CSO #12P	CSO #13P	CSO #18P
CSO #19P	CSO #21P	CSO #25P	CSO #26P	CSO #27P
CSO #31P				

The 10 SSO engineered structures were designed to relief the collection system in the event of surcharge caused by rain events; whereas, the 11 CSO structures were part of the two combined system areas in the City, namely Forest Park and Walbrook. Figure 2.1.1 on the next page shows the location of the 21 structures in the Gwynns Falls Sewershed.

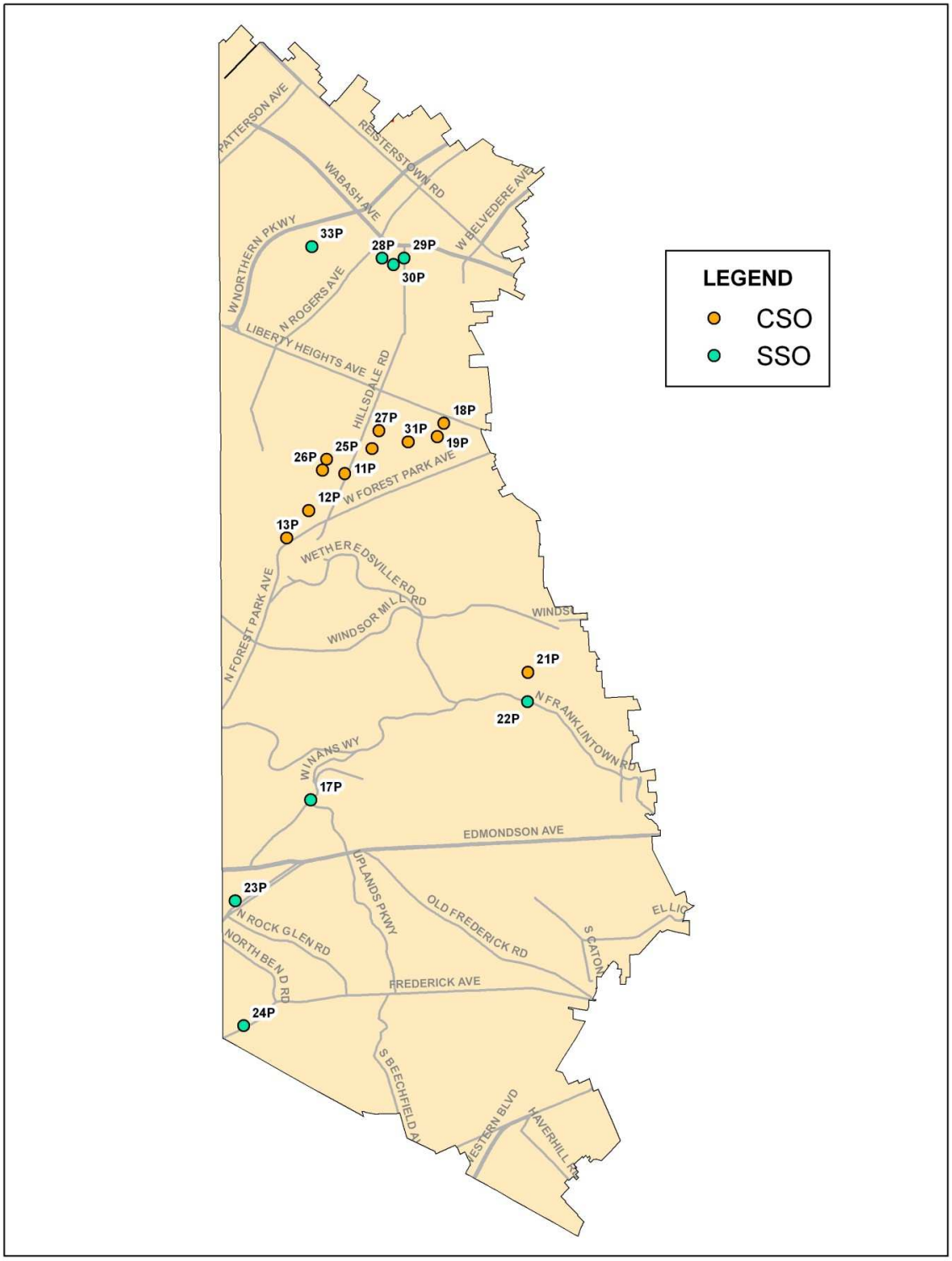
2.2 Construction Projects

A listing and brief descriptions of the Paragraph 8 projects are presented in Table 2.2.1, all of which have been represented in the hydraulic model under baseline conditions.

Table 2.2.1 – Paragraph 8 Projects in the Gwynns Falls Sewershed

Para 8 Projects	Project	Contract	Description	Const. Complete	SSO Elimination	Eliminates
17	Powder Mill System Improvements	SC 777	Rehabilitation of 12,000' of 12" to 24" conveyance piping	2/22/2005	6/30/2007	28P, 29P, 30P, 33P
		SC 804	Rehabilitation of 33,000' of 8" to 10" collection piping	6/2/2005	6/30/2007	
18	Dead Run System Improvements	SC 825	Clean, inspect and rehabilitate 20,000' of 12" to 24" conveyance piping and 11,000' of 8" to 12" collection piping	5/19/2006	6/19/2006	16P,17P
		SC 788	Clean, inspect and rehabilitate 11,000' of 8" to 12" collection piping	5/15/2004	6/19/2006	
19	Maiden Choice Interceptor	SC 826	Clean, inspect and rehabilitate 12,400' of 12" to 24" conveyance piping	9/14/2006	6/30/2008	23P, 24P
20	Elimination of Siphon Blow-offs 11 & 12	SC 827	Cleaning and inspection of siphons with repairs as ncessary	6/30/2004	N/A	84, 22P
21	Walbrook	SC 780	Implementation of long term control pland and combined sewer separation design in Walbrook area	3/31/2002	4/30/2003	21P
22	Forest Park	SC 780	Implementation of long term control plan and combined sewer separation design in Forest Park area	10/28/2004	10/12/2004	10P, 11P, 12P, 13P, 18P, 19P, 25P, 26P, 27P, 31P
		SC 813	Implementation of long term control plan and combined sewer separation design in Forest Park area	6/22/2005	6/19/2006	

Figure 2.1.1 – Location of Engineered SSOs in the Gwynns Falls Sewershed



2.3 Pre- and Post- Construction Flow Monitoring

Following the signing of the CD in September 2002, the City of Baltimore began implementing a flow monitoring program in the Spring of 2003 to measure the flow at the engineered SSO locations throughout the City. Although most of the construction projects started before the flow monitoring program, the City was able to collect pre and post-construction flow monitoring as depicted in Table 2.3.1 below. Regarding the CSOs, flow monitoring was performed in the Forest Park and Walbrook CSO areas for the purpose of designing the separation projects, not for the purpose of monitoring CSO activity.

Table 2.3.1 – Flow Monitoring Data for SSO Structures

SSO#	Pre-Construction Flow Monitoring	SSO Sealed	Post-Construction Flow Monitoring	Flow Level Reached Manhole Depth Post Construction
16P	No	06/19/06	Yes	No
17P	No	08/31/05	Yes	No
22P	No	06/30/04	Siphon Blow-off *	
23P	Yes	04/03/07	Yes	No
24P	Yes	04/03/07	Yes	No
28P	No	10/12/05	Yes	Yes
29P	No	10/15/05	Yes	Yes
30P	No	06/26/07	Yes	Yes
33P	No	10/12/05	Yes	Yes
84	No	06/30/04	Siphon Blow-off *	

* Post-construction flow monitoring was waved for these sites.

The post construction flow data indicate that in most cases flow levels reached and surpassed the elevation of the eliminated SSO pipe invert, indicating that the pipes were surcharged during rain events. Furthermore, the post-construction flow data indicates that at half of the sites levels reached the manhole depth, indicating that overflows have occurred after construction of the projects.

2.4 Hydraulic Model Simulations

The CD requires that the hydraulic model be used in conjunction with available flow monitoring to evaluate effectiveness of the Paragraph 8 construction projects. To accomplish this, two hydraulic model simulations were performed for a 2-year, 24-hour storm. The first simulation was performed with no Paragraph 8 projects in place (pre-construction). This first simulation yielded a total SSO volume of approximately 167,000 gallons. For the second simulation the model was modified to include the Paragraph 9 Projects (post-construction). The second simulation yielded a total SSO volume of about 158,000 gallons, or a 5.1% reduction in SSO volume after the construction projects.

2.5 Conclusions

Projects No. 21 and No. 22 were designed to separate the combined systems in the Walbrook and Forest Park areas respectively, and to eliminate the eleven CSO structures listed in sub-section 2.1 above. These projects were successful in separating the storm and the sanitary sewers and eliminating the CSO structures. Flow data indicates that overflows have occurred at 50% of the SSO sites after the completion of the Paragraph 8 Projects. This indicates that the Paragraph 8 projects intended to eliminate SSO structures in the Gwynns Falls Sewershed have been partially successful in eliminating overflows. Lastly, a comparison of pre and post-construction hydraulic model simulations shows a 5.1% reduction in SSO volume.

This report, therefore, concludes that the Paragraph 8 construction projects in the Gwynns Falls Sewershed have been effective in eliminating CSO structures, and have been partially successful in providing additional hydraulic capacity and in reducing SSOs. The Paragraph 8 projects, however, have not been sufficient and additional construction projects will be necessary as identified and recommended in Sections 5 and 7 of this report.